Food and Agriculture Organization of the United Nations

FAO's response to the *Nature Communications* article "Catch reconstructions reveal that global marine fisheries catches are higher than reported and declining"

19 January 2016. The article "Catch reconstructions reveal that global marine fisheries catches are higher than reported and declining" by Pauly and Zeller published in *Nature Communications* argues that catch reconstructions, compiled from a number of separate studies, support a different conclusion about the magnitude and recent trend of marine catches than what is shown by FAO capture production database being compiled since 1950.

General reaction

FAO supports research efforts to improve fisheries information. FAO welcomes this communique published in well-known scientific literature as it feeds the international discussion on unreported catches and contributes to raising awareness on issues which are critical to FAO's mandate of improving food security and alleviating poverty. This publication also demonstrates the uniqueness and usefulness of FAO's work on compiling global fishery statistics

FAO also appreciate the call for more resources for improved and expanded primary data. Our primary data – collected since 1950 – provide the factual foundations for informed policy and decision making in fisheries, including fisheries management. It is a key component of the implementation of the FAO Code of Conduct for Responsible Fisheries, which Countries adopted some 20 years ago. The Code and its supporting international instruments, provides basic principles for fisheries management.

FAO would also like to call attention to the paradigm shifts that have occurred in the fisheries and aquaculture world in the last half century. Gone are the days of the productivity paradigm of continuously higher catches; capture fisheries governance is now focused on ensuring sustainable catch levels with maximum economic value of these catches, with aquaculture growth bridging the gap between supply and demand

FAO data

As early as the 1950s, FAO has collected and published Capture Production statistics, focusing on total landings, and their contribution to global food security . As the paper correctly identifies, the FAO database is based mainly, but not exclusively, on reporting from member countries.

Reconstructed catches attempt to estimate total removals including figures that are often not reported as part of the official statistics, i.e. discards, small-scale fisheries (as defined in the paper) and illegal fishing. This is a different objective than that of the FAO statistical database.

FAO uses mainly official data. These data reported by governments and regional fisheries bodies, and applying standards to ensure consistency and reduce uncertainty, serve as a worldwide reference for various users, including academia, fisheries management organizations, development agencies, etc. . These users can utilize the official data and apply correction factors, as has been done in this paper and others.

The technique

Reconstructed catches is san example of a scientific work which would be impossible in the absence of FAO data. In fact this work builds twice on FAO statistics, not only it integrates reported catches, but also estimates of unreported data are often multipliers of FAO statistics.

The idea of catch reconstructions has merit. Similar removal estimates are already included in assessments of status of resources conducted at the national level and by regional fisheries bodies. Although catch alone is of limited use in assessing the status of a resource, it is the main factor in such analyses.

The challenge in many of the catch reconstructions is that often there is insufficient data to produce estimates that are sufficiently accurate. Therefore, analysis needs to mitigate the lack of data with assumptions about the unknown catches that can be questionable. Of particular concern are assumptions about how this unknown catches evolved over time. Furthermore, the data that form the basis of these estimates are scarce, thereby creating a wider uncertainty around the final figures.

What FAO does to address misreporting

FAO exercises great caution with under-reporting and over-reporting. FAO addresses this through collaboration and data exchange with Regional Fishery Bodies and international organizations such as OECD, UNSD or Eurostat, enabling FAO to improve estimates before publishing, in consultation with the concerned countries .

As the *Nature* article states, countries are ultimately responsible for their reporting. FAO's action to improve the situation on reported catches proceeds through working closely with countries who require assistance and capacity building to improve their data collection systems, policies, legislation, standards, and surveillance systems. The *Nature* article highlights the need for additional funding for this important work.

The FAO statistics represent only a small portion of FAO's interactions with its Member Countries when it comes to work related to data and information. FAO also develops methodologies and estimates on discards, by-catch, illegal fishing, unreported catches in small scale and subsistence fisheries, and integrates the use of innovative technologies.

Finally, it is also worth noting that implementation by Member Countries of FAO International plans of action [1]or guidelines [2] contributes to improved reporting.

[1] International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing http://www.fao.org/fishery/ipoa-iuu/en

[2] Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries http://www.fao.org/fishery/ssf/guidelines/en

Differences of perspective

The article highlights adecline of catches, whereas FAO reports a stability of landed catch trends in recent years. Detailed judgement on the scientific value of this work will undoubtedly be undertaken by experts as in past occasions. As far as FAO is concerned, a few technical elements in the methodology have already caused concern[3]. In particular, calculating trends from the highest point in the series, and omitting the most recent years leads to a high probability of a declining trend.

As previously said, FAO statistics do not intend to reflect total catches so FAO can only acknowledge this study, noting concerns mentioned above as well as that FAO catch trends remain within the uncertainty ranges of the study.

In spite of the technical reservations on the trends, FAO agrees with the basic conclusions of the paper: catch statistics (including estimates of additional sources of removals) can and should be improved, and this requires additional funding andinternational collaboration and country commitment. FAO's Committee on Fisheries (COFI) has been the global forum for such consultation.

Finally, caution is required not to amalgamate catch trends with trends in state of fishery resources. De facto, the paper does not mention fisheries status nor stock health. And while FAO partly builds its assessment on the state of world fish resources on FAO catch statistics, its methodology equally integrates other, reliable sources for drawing its conclusions.

[3] see technical considerations below

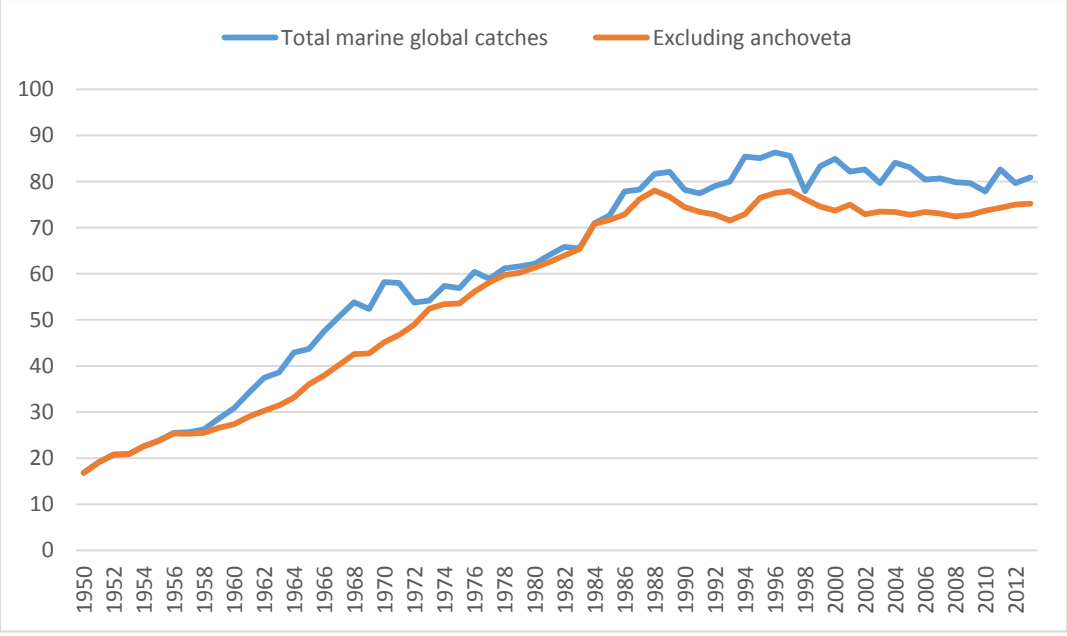
Annex 1

More technical considerations – in response to the "decline"

It's interesting to understand the cause for underestimates, but in a context of uncertainties people rather rely on trends. By the methodology applied building on relatively static raising factors, the studies' trends result (except few exceptions) as mirrors of FAO statistics, and by the time range selected stopping in 2010 (when FAO trends were going down, contrary to more recent years), this mirroring results in negative trends at the end of the series, hence contributing to the estimated decline.

Data on global marine capture production, as compiled by FAO on the basis of official statistics complemented with other sources (e.g. data from the tuna and other Regional Fishery Bodies), do not show any decline but a stable trend since 2000. The supposed decline in the FAO data reported by the paper in *Nature* is due to the fact that the authors picked up the highest year ever (1996, 86.4 million tonnes) and the lowest year since 1991 (2010, 77.9 million tonnes). If they would have picked up another period of recent years (e.g. 2006-2013) the trend line would have resulted positive.

Global catch trends included in SOFIA since the 2002 issue always mention that annual total global marine catches is strongly affected by the highly variable catches of the Peruvian anchoveta and that global trends should be examined excluding this species: there the stability of global marine catches since mid-1990s claimed by FAO becomes quite evident (see chart below). Since 2000, the absolute variations in comparison with the previous year of total marine catches excluding anchoveta was above 2 percent only in one year (2.7% in 2002). This effect of anchoveta variations on global trends of catch reconstructions is never mentioned in the current Nature paper.



Global catches reconstructed by the authors have an enormous range of uncertainty (see Figure 1 in paper) with the lower bound of uncertainty below the so-called "reported catches". We were

surprised that in chart (Figure 4) showing the global trend of reconstructed catches the major component driving the supposed decline were the Industrial catches as in many of the “catches reconstruction” by country the decline was due to high discards up to late 1990s. Starting the 2000s, discards were reduced as a positive effect of better fisheries management by many countries and Regional Fisheries Bodies. It should be noted that catches by important segments of the global industrial fisheries (e.g. tunas, shrimps, cephalopods, etc.) are still showing growing trends, not only in the data compiled by FAO but also in those by other organizations (i.e. the tuna Regional Fisheries Management Organizations).

FAO is aware that a part of global small scale catches are not included in the official statistics and is actively working in projects with regional organizations (e.g. COREP and FCWC in West Africa) to improve the coverage of small scale fisheries in the national data collection systems. However, it should be taken into account that the definition of “small scale” and “artisanal” fisheries varies from country to country and that small scale fisheries are covered and already included in national official statistics of several countries (e.g. Chile and Peru).

FAO experts were also puzzled by some of the catch reconstructions by FAO areas presented in Figure 3. Catches in the Eastern Indian Ocean (57) and Western Central Pacific (71) are still growing according to official statistics but there are evidences that some countries in these areas over report. In this situation, it is difficult to accept that reconstructed catches, even in latest years, are very much higher than the total reported catches.